

3048

DRINKING WATER SURVEILLANCE PROGRAM

**OHSWEKEN
WATER TREATMENT
PLANT**

REPORT FOR 1991 AND 1992

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DRINKING WATER SURVEILLANCE PROGRAM
REPORT FOR 1991 AND 1992**

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PIBS 3048

EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

OHSWEKEN WATER TREATMENT PLANT 1992 REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

The Ohsweken water treatment plant is a package plant which uses conventional treatment and treats water from the Grand River. The process consists of coagulation, flocculation, sedimentation, filtration and disinfection. This plant has a design capacity of $1.4 \times 1000 \text{ m}^3/\text{day}$. The Ohsweken water treatment plant serves a population of approximately 2,000.

Water at the plant was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

Table A is a summary of all results by group.

No known health related guidelines were exceeded from samples analysed on DWSP.

The Ohsweken water treatment plant, for the sample year 1992, produced acceptable quality water with the exception of N-nitrosodimethylamine (NDMA). NDMA was frequently detected by a monitoring program independent of DWSP, at levels above the Interim Maximum Acceptable Concentration of 9 ng/L (ppt). An interim report providing information on NDMA levels and methods of eliminating NDMA from this water supply has been recently published by the Drinking Water Section (Removal of N-Nitrosodimethylamine (NDMA) from the Ohsweken Water Supply. July, 1993. ISBN 0-7778-1542-7).

No samples were taken in the distribution system during this sample period.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM 1992 OHSWEKEN WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '-' INDICATES THAT NO SAMPLE WAS TAKEN

	TREATMENT PLANT		TREATMENT PLANT		
	RAW TESTS	POSITIVE %POSITIVE	TREATED TESTS	POSITIVE %POSITIVE	TOTAL TESTS
SCAN					
BACTERIOLOGICAL	21	15	71	7	44
CHEMISTRY (FIELD)	12	12	100	39	34
CHEMISTRY (LABORATORY)	184	181	98	191	157
METALS	192	103	53	192	77
CHLORAROMATICS	112	0	0	112	0
CHLOROPHENOLS	12	0	0	12	0
PESTICIDES AND PCB	279	1	0	279	1
PHENOLICS	8	1	12	8	1
POLYAROMATIC HYDROCARBONS	17	0	0	17	0
SPECIFIC PESTICIDES	48	0	0	48	0
VOLATILES	248	0	0	248	25
TOTAL	1,133	313	1,153	299	

DRINKING WATER SURVEILLANCE PROGRAM

OHSWEKEN WATER TREATMENT PLANT 1992 REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Ohsweken water treatment plant in March 1992. This is the first published DWSP report.

PLANT DESCRIPTION

The Ohsweken water treatment plant is a package plant which uses conventional treatment and treats water from the Grand river. The process consists of coagulation, flocculation, sedimentation, filtration and disinfection. This plant has a design capacity of 1.40 x 1000 m³/day. The Ohsweken water treatment plant serves a population of approximately 2,000.

The sample day flows were not available.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Stringent DWSP sampling protocols were followed to ensure that all samples were collected in a uniform manner (see Appendix B).

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it

was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

To obtain a representative raw water sample, free from any added chemicals, at plants which used chlorine for zebra mussel control, the operator was required to turn off the chlorine feed to the mouth of the intake and allow enough time for the chlorinated water to clear from the intake works.

Plant operating personnel routinely analyzed parameters for process control (Table 2).

At all distribution system locations, two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples, therefore, were laboratory chemistry and metals. The free flow sample represented fresh water from the distribution system main, since the sample tap was flushed for five minutes prior to sampling.

Water at the plant was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour. No samples were taken in the distribution during this sample period.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 (when data is provided) contains information on delay time between the raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary of all results by parameter and by water type. If a parameter was not detected, the total number of negative

sample results is given. In contrast, if a parameter was detected at any location, the detailed results for all samples are provided.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment and Energy laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 4 and 5. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- THE TREATED AND DISTRIBUTED WATER;**
- ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE
GUIDELINE VALUES; AND**
- POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples. Standard plate count was the only bacteriological analysis conducted on the treated and distributed water.

Standard plate count is a test used to supplement routine analysis for coliform bacteria. The limit for standard plate count (at 35°C after 48 hours) in the ODWOs is 500 counts/mL (based on a geometric mean of 5 or more samples). DWSP bacteriological analysis of treated and distributed water was limited to standard plate count.

Standard plate count (membrane filtration) exceeded the ODWO Aesthetic Objective of 500 counts/mL in 1 of 7 treated water samples with a maximum reported value of >2,400 counts/mL.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of delivered water may increase in the distribution system due to the warming effect of soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Aesthetic Objective of 15°C in 2 of 5 treated and distributed water samples with a maximum reported value of 20°C.

CHEMISTRY (LABORATORY)

Colour in drinking water may be due to the presence of natural or synthetic substances as well as certain metallic ions. Colour is measured in Hazen units (HZU).

Colour exceeded the ODWO Aesthetic Objective of 5 HZU in 1 of 8 treated water samples with a maximum reported value of 7.0 HZU.

Elevated conductivity is often associated with high hardness levels.

Conductivity exceeded the European Economic Community Aesthetic Guideline Level of 400 umho/cm in all 8 treated water samples with a maximum reported value of 772 umho/cm.

The ODWOS indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Recommended Operational Guideline of 80-100 mg/L with values greater than 200 mg/L in all 8 treated water samples with a maximum reported value of 311 mg/L.

Total ammonium exceeded the European Economic Community Aesthetic Guideline Level of 0.05 mg/L in 4 of 8 treated water samples with a maximum reported value of 0.16 mg/L.

pH exceeded the ODWO Recommended Operational Guideline of 6.5-8.5 pH units in 1 of 8 treated water samples with a maximum reported value of 8.53 pH units.

Dissolved solids exceeded the ODWO Aesthetic Objective of 500 mg/L in 1 of 8 treated water samples with a maximum reported value of 502 mg/L.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to measure the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant to avoid problems in the distribution system.

Aluminum exceeded the ODWO Recommended Operational Guideline of 100 ug/L in 3 of 8 treated water samples with a maximum reported value of 190 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that one parameter was detected at a trace level in one treated water sample.

PESTICIDES AND PCB

Atrazine was found at a positive level in 1 treated water sample and at trace levels in all of the other 7 treated water samples analyzed. The maximum observed level was 1,680 ng/L. This was below the ODWO Interim Maximum Acceptable Concentration of 60,000 ng/L.

Desethyl atrazine was detected at trace levels in the treated water. Other pesticides including ametrine and simazine were detected in one raw water sample.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs have been revised to replace the phenolic aesthetic objective with objectives for specific phenols.

Phenolics was found at a positive level in 1 of the 8 treated water samples analyzed. The maximum observed level was 1.4 ug/L.

POLYAROMATIC HYDROCARBONS

The results of the polyaromatic hydrocarbon scan showed that none were detected.

SPECIFIC PESTICIDES

The results of the specific pesticide scan showed that one parameter 2,4-D was detected at a trace level in one raw water sample.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology. Trace levels of styrene are considered to be laboratory artifacts resulting from the sample shipping containers.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane. Bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THM results are discussed. Starting in 1991, samples from the distribution system were quenched with sodium thiosulphate to stop the further production of THMs in the sample bottle. This provided a more representative estimation of the THMs consumed in tap water.

Total trihalomethanes were found at positive levels in 6 of 8 treated water samples analyzed. The maximum observed level was 97.4 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

RADIOLOGICAL

The radionuclide samples were not taken during this sample period.

CONCLUSIONS

The presence of a number of pesticides would indicate that the raw water source is adversely affected by agricultural activity.

No known health related guidelines were exceeded from samples analysed on DWSP.

The Ohsweken water treatment plant, for the sample year 1992, produced acceptable quality water with the exception of N-nitrosodimethylamine (NDMA). NDMA was frequently detected by a monitoring program independent of DWSP, at levels above the Interim Maximum Acceptable Concentration of 9 ng/L (ppt). An interim report providing information on NDMA levels and methods of eliminating NDMA from this water supply has been recently published by the Drinking Water Section (Removal of N-Nitrosodimethylamine (NDMA) from the Ohsweken Water Supply. July, 1993. ISBN 0-7778-1542-7).

No samples were taken in the distribution system during this sample period.

FIGURE 1
OHSWEKEN (SIX NATIONS) WATER TREATMENT PLANT

SCHEMATIC DIAGRAM

CHARACTERISTICS

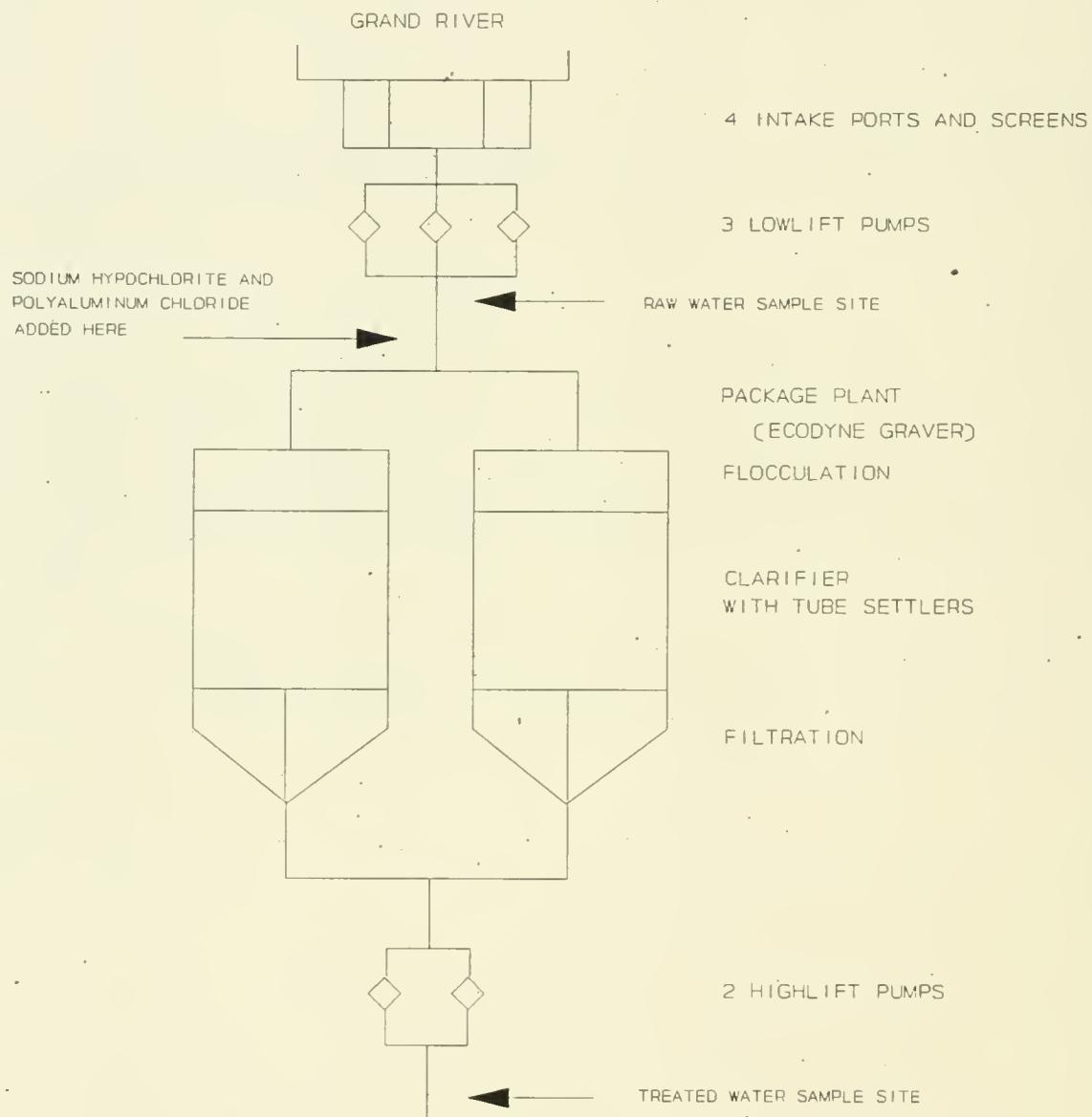


TABLE 1
DRINKING WATER SURVEILLANCE PROGRAM
PLANT GENERAL REPORT

PLANT NAME: OHSWEKEN WTP
WORKS #: 230000174
UTM #: -

DISTRICT: CAMBRIDGE
REGION: WEST CENTRAL
DISTRICT OFFICER: J. TAYLOR

SUPERINTENDENT: M. JOHNSON

ADDRESS: PUBLIC WORKS DEPT. GEN. DEL.
OHSWEKEN, ONTARIO
NOA 1M0
519-752-4712

MUNICIPALITY: OHSWEKEN
AUTHORITY: FEDERAL

PLANT INFORMATION

PLANT VOLUME: - (X 1000 M3)
DESIGN CAPACITY: 1.400 (X 1000 M3/DAY)
RATED CAPACITY: 1.408 (X 1000 M3/DAY)

MUNICIPALITY	POPULATION
-----	-----
OHSWEKEN	1,500
OHSWEKEN RESERVE	500

KEY TO TABLE 4 and 5

- A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
 - 1. Maximum Acceptable Concentration (MAC)
 - 1+. MAC for Total Trihalomethanes
 - 2. Interim Maximum Acceptable Concentration (IMAC)
 - 3. Aesthetic Objective (AO)
 - 3*. AO for Total Xylenes
 - 4. Recommended Operational Guideline
 - 5. Health Related Guidance Value
- B HEALTH & WELFARE CANADA (H&W)
 - 1. Maximum Acceptable Concentration (MAC)
 - 2. Proposed MAC
 - 3. Interim MAC
 - 4. Aesthetic Objective (AO)
- C WORLD HEALTH ORGANIZATION (WHO)
 - 1. Guideline Value (GV)
 - 2. Tentative GV
 - 3. Aesthetic GV
- D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
 - 1. Maximum Contaminant Level (MCL)
 - 2. Suggested No-Adverse Effect Level (SNAEL)
 - 3. Lifetime Health Advisory
 - 4. EPA Ambient Water Quality Criteria
- F EUROPEAN ECONOMIC COMMUNITY (EEC)
 - 1. Health Related Guideline Level
 - 2. Aesthetic Guideline Level
 - 3. Maximum Admissible Concentration (MADC)
- G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE
- I NEW YORK STATE AMBIENT WATER GUIDELINE
- N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

No Sample Taken
BDL Below Minimum Measurement Amount
<T Greater Than Detection Limit But Not Confident
(SEE INTERPRETATION OF RESULTS ABOVE)
> Results Are Greater Than The Upper Limit
<=> Approximate Result
!48 No Data: Sample Age Exceeded 48 Hours
!AR No Data: No Numeric Results
!AW No Data: Analysis Withdrawn
!BT No Data: Sample Broken In Transit
!CS No Data: Contamination Suspected
!EF No Data: Laboratory Equipment Failure
!IR No Data: Insufficient Sample
!IS No Data: Insufficient Sample
!LA No Data: Laboratory Accident
!NP No Data: No Procedure
!NR No Data: Sample Not Received
!OP No Data: Obscured Plate
!PE No Data: Procedure Error: Sample Discarded
!PR No Data: Preservative Required
!QU No Data: Quality Control Unacceptable
!RE No Data: Received Empty
!RO No Data: No Numeric Results
!SM No Data: Sample Missing
!SS No Data: Sample Improperly Preserved
!U No Data: Sample Unsuitable For Analysis
!UB No Data: Bottle Broken
!UN No Data: Result Unreliable

!UR No Data: Unpreserved Sample Required
A Approximate Value
A3C Approximate, Total Count Exceeded 300 Colonies
A> Approximate Value, Exceeded Normal Range
APS Additional Peak, Less Than, Not Priority Pollutant
ARO Additional Information In Laboratory Report
CRO Calculated Result Only
NAF Not All Required Tests Found
RID Ioncal Calculated on Incomplete Data Set
RMP P and M-Xylene Not Separated
RRR Result Obtained by Repeat Analysis
RRV Rerun Verification
SFA Sample Filtered: Filtrate Analyzed
SIL Sample Incorrectly Labelled
SPS Several Peaks, Small, Not Priority Pollutant
U48 Unreliable: Sample Age Exceeded 48 Hours
UAL Unreliable: Sample Age Exceeded Limit
UAU Unreliable: Sample Age Unknown
UCS Unreliable: Contamination Suspected
WSD Wrong Sample Description On Bottle

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT
RAW TREATMENT PLANT
TREATED

TREATMENT PLANT	BACTERIOLOGICAL	DET'N LIMIT = 0	GUIDELINE = 0 (A1)
FECAL COLIFORM MF (CT/100ML)			
1992 MAR	440		
1992 MAY	290		
1992 JUN	30 <=>		
1992 JUL	70 <=>		
1992 AUG	60 <=>		
1992 SEP	650		
1992 OCT	1500 >		
STANDARD PLATE CNT MF (CT/ML)		DET'N LIMIT = 0	GUIDELINE = 500 (A3)
1992 MAR		13	
1992 MAY		6 <=>	
1992 JUN		2 <=>	
1992 JUL		2400 >	
1992 AUG		190	
1992 SEP		24	
1992 OCT		1 <=>	
TOTAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0	GUIDELINE = 5/100ML (A1)
1992 MAR	25000		
1992 MAY	2500 A3C		
1992 JUN	400 <=>		
1992 JUL	700 <=>		
1992 AUG	500 <=>		
1992 SEP	3000 A3C		
1992 OCT	7600 A3C		
T COLIFORM BCKGND MF (CT/100ML)		DET'N LIMIT = 0	GUIDELINE = N/A
1992 MAR	48000		
1992 MAY	34000 A3C		
1992 JUN	20000		
1992 JUL	76000 A3C		
1992 AUG	30000 A3C		
1992 SEP	02000 A3C		
1992 OCT	75000 A3C		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	CHEMISTRY (FIELD)	DET'N LIMIT = 0	GUIDELINE = N/A
		FLD CHLORINE (COMB) (MG/L)		
		1992 MAR	.800	
		1992 MAY	.300	
		1992 JUN	.400	
		1992 AUG	.100	
		1992 SEP	.200	
		1992 OCT	.300	
		1992 DEC	.700	
		FLD CHLORINE FREE (MG/L)		
		1992 MAR	.000	
		1992 MAY	.000	
		1992 JUN	.500	
		1992 AUG	.000	
		1992 SEP	.000	
		1992 OCT	.100	
		1992 DEC	.000	
		FLD CHLORINE (TOTAL) (MG/L)		
		1992 MAR	.800	
		1992 MAY	.300	
		1992 JUN	.900	
		1992 AUG	.100	
		1992 SEP	.200	
		1992 OCT	.400	
		1992 DEC	.700	
		FLD PH (OMNISSLESS)		
		1992 MAR	7.500	7.400
		1992 MAY	7.500	7.300
		1992 JUN	7.700	7.200
		1992 AUG	7.700	7.100
		1992 SEP	7.700	7.300
		1992 OCT	7.700	7.200
		1992 DEC	7.800	7.300

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEEKEN WTP

TREATMENT PLANT TREATMENT PLANT
RAW TREATED

CHEMISTRY (FIELD)		DET'N LIMIT = N/A	GUIDELINE = 15 (A3)
FLD TEMPERATURE (DEG.C)	FLD TEMPERATURE (DEG.C)		
1992 MAR	3.000	3.000	
1992 MAY	10.000	10.000	
1992 JUN	16.000	17.000	
1992 SEP	19.000	20.000	
1992 OCT	1.000	12.000	

CHEMISTRY (FIELD)		DET'N LIMIT = N/A	GUIDELINE = 1.0 (A1)
FLD TURBIDITY (FTU)	FLD TURBIDITY (FTU)		
1992 MAR	.150		
1992 JUN	.400		
1992 AUG	.300		
1992 SEP	.300		
1992 OCT	.200		
1992 DEC	.400		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT TREATMENT PLANT
RAW TREATED

CHEMISTRY (LABORATORY)		DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A4)
ALKALINITY (MG/L)			
1992 MAR	157.100	149.400	
1992 MAY	190.900	150.700	
1992 JUN	185.600	147.500	
1992 JUL	226.200	183.800	
1992 AUG	193.400	152.200	
1992 SEP	238.500	200.300	
1992 OCT	236.100	179.300	
1992 DEC	255.100	199.700	
CALCIUM (MG/L)		DET'N LIMIT = 0.20	GUIDELINE = 100 (F2)
1992 MAR	60.100	65.400	
1992 MAY	66.600	64.700	
1992 JUN	79.400	83.300	
1992 JUL	90.720	86.880	
1992 AUG	76.100	76.300	
1992 SEP	84.300	85.850	
1992 OCT	81.450	77.600	
1992 DEC	87.800	76.900	
CYANIDE (MG/L)		DET'N LIMIT = 0.001	GUIDELINE = 0.2 (A1)
7 SAMPLES	BDL		
CHLORIDE (MG/L)		DET'N LIMIT = 0.20	GUIDELINE = 250 (A3)
1992 MAR	28.000	46.500	
1992 MAY	28.700	52.100	
1992 JUN	66.100	104.000	
1992 JUL	53.100	75.000	
1992 AUG	53.500	83.900	
1992 SEP	39.200	70.100	
1992 OCT	31.900	65.900	
1992 DEC	31.400	59.800	
COLOUR (CHU)		DET'N LIMIT = 0.50	GUIDELINE = 5 (A3)
1992 MAR	17.500	5.000	
1992 MAY	25.000	4.000	
1992 JUN	16.000	3.000	
1992 JUL	20.500	7.000	
1992 AUG	15.500	4.500	
1992 SEP	22.500	4.000	
1992 OCT	39.500	5.000	
1992 DEC	22.000	3.000	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT	RAW	TREATMENT PLANT	TREATED	CHEMISTRY (LABORATORY)	DET'N LIMIT = 1.0	GUIDELINE = 400 (F2)
CONDUCTIVITY (UMHO/CM)						
1992 MAR	474			533		
1992 MAY	511			528		
1992 JUN	706			772		
1992 JUL	731			746		
1992 AUG	663			721		
1992 SEP	635			697		
1992 OCT	580			626		
1992 DEC	616			659		
DISS ORG CARBON (MG/L)						
1992 MAR	4.900			2.900		
1992 MAY	6.300			2.700		
1992 JUN	4.700			2.700		
1992 JUL	5.500			3.100		
1992 AUG	4.500			2.400		
1992 SEP	6.000			3.200		
1992 OCT	6.800			2.900		
1992 DEC	4.800			2.400		
FLUORIDE (MG/L)						
				DET'N LIMIT = 0.01		GUIDELINE = 1.5 (A1)
1992 MAR	.120			.080		
1992 MAY	.120			.060		
1992 JUN	.140			.060		
1992 JUL	.160			.100		
1992 AUG	.120			.060		
1992 SEP	.140			.080		
1992 OCT	.120			.060		
1992 DEC	.100			.040 <1		
HARDNESS (MG/L)						
1992 MAR	209,000			227,000		
1992 MAY	233,000			231,000		
1992 JUN	293,000			304,000		
1992 JUL	321,000			311,000		
1992 AUG	282,000			284,000		
1992 SEP	298,910			304,530		
1992 OCT	284,000			274,000		
1992 DEC	308,000			282,000		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT TREATMENT PLANT
RAW TREATED

CHEMISTRY (LABORATORY)		DET'N LIMIT = N/A	GUIDELINE = N/A
IONCAL (OMNSLESS)			
1992 MAR	1.650 RID	.257 RID	
1992 MAY	4.139 NAF	2.486 NAF	
1992 JUN	.824	2.100	
1992 JUL	1.421 NAF	.071 NAF	
1992 AUG	2.650 NAF	1.084 NAF	
1992 SEP	1.134	.389	
1992 OCT	.191	.196	
1992 DEC	.223	4.611	
POTASSIUM (MG/L)		DET'N LIMIT = 0.01	GUIDELINE = 10 (F2)
1992 MAR	3.710	3.650	
1992 MAY	3.000	2.784	
1992 JUN	3.340	3.310	
1992 JUL	3.450	3.770	
1992 AUG	2.940	2.880	
1992 SEP	3.796	3.503	
1992 OCT	4.910	5.328	
1992 DEC	2.762	2.700	
LANGELIERS INDEX (OMNSLESS)		DET'N LIMIT = N/A	GUIDELINE = N/A
1992 MAR	.867 RID	1.056 RID	
1992 MAY	1.052	.765	
1992 JUN	1.092	.730	
1992 JUL	1.184 NAF	.795 NAF	
1992 AUG	1.123 NAF	.738 NAF	
1992 SEP	1.300	1.069	
1992 OCT	1.105	.641	
1992 DEC	1.318	.852	
MAGNESIUM (MG/L)		DET'N LIMIT = 0.1	GUIDELINE = 30.0 (F2)
1992 MAR	14.300	15.500	
1992 MAY	16.080	16.920	
1992 JUN	22.900	23.400	
1992 JUL	22.920	22.800	
1992 AUG	22.300	22.600	
1992 SEP	21.480	21.900	
1992 OCT	19.700	19.500	
1992 DEC	21.700	21.900	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT
RAW TREATMENT PLANT
TREATED

CHEMISTRY (LABORATORY)		DET'N LIMIT = 0.20	GUIDELINE = 200 (A4)
SOIUM (MG/L)			
1992 MAR	14.200	18.500	
1992 MAY	15.190	15.290	
1992 JUN	41.200	48.400	
1992 JUL	32.500	29.280	
1992 AUG	32.500	34.900	
1992 SEP	23.220	26.220	
1992 OCT	16.580	22.900	
1992 DEC	17.680	19.300	
AMMONIUM TOTAL (MG/L)		DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)
1992 MAR	.002 <T	.160	
1992 MAY	.092	.052	
1992 JUN	.108	BDL	
1992 JUL	.036	.030	
1992 AUG	.038	.070	
1992 SEP	BDL	.014	
1992 OCT	.074	.008 <T	
1992 DEC	.030	.068	
NITRITE (MG/L)		DET'N LIMIT = 0.001	GUIDELINE = 1.0 (A1)
1992 MAR	.010	.009	
1992 MAY	.073	.004 <T	
1992 JUN	.041	BDL	
1992 JUL	.035	.019	
1992 AUG	.024	.004 <T	
1992 SEP	.005	.004 <T	
1992 OCT	.053	BDL	
1992 DEC	.128	.004 <T	
NITRATE (TOTAL) (MG/L)		DET'N LIMIT = 0.005	GUIDELINE = 10.0 (A1)
1992 MAR	5.730	5.720	
1992 MAY	3.810	3.780	
1992 JUN	2.440	2.320	
1992 JUL	3.770	4.190	
1992 AUG	2.280	2.240	
1992 SEP	2.560	2.570	
1992 OCT	2.960	2.760	
1992 DEC	2.950	2.870	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT TREATMENT PLANT
RAW TREATED

	CHEMISTRY (LABORATORY)		DET'N LIMIT = 0.02	GUIDELINE = N/A
NITROGEN TOT KJELD (MG/L)				
1992 MAR	1.600	.600		
1992 MAY	.980	.410		
1992 JUN	.670	.330		
1992 JUL	.800	.420		
1992 AUG	.640	.370		
1992 SEP	1.110	.380		
1992 OCT	1.170	.410		
1992 DEC	.710	.390		
PH (OMNSLESS)				GUIDELINE = 6.5-8.5 (A4)
1992 MAR	8.350	8.530		
1992 MAY	8.410	8.240		
1992 JUN	8.400	8.120		
1992 JUL	8.350	8.070		
1992 AUG	8.430	8.150		
1992 SEP	8.470	8.310		
1992 OCT	8.290	7.970		
1992 DEC	8.440	8.140		
PHOSPHORUS FIL. REACT (MG/L)			DET'N LIMIT = 0.0005	GUIDELINE = N/A
1992 MAR	.106	.001 <T		
1992 MAY	.045	.001 <T		
1992 JUN	.014	BDL		
1992 JUL	.036	BDL		
1992 AUG	.004 <T	BDL		
1992 SEP	.031	BDL		
1992 OCT	.068	.001 <T		
1992 DEC	.042	.001 <T		
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.40 (F2)
1992 MAR	.390	.010		
1992 MAY	.178	.005 <T		
1992 JUN	.071	.003 <T		
1992 JUL	.111	.002 <T		
1992 AUG	.059	.004 <T		
1992 SEP	.260	.003 <T		
1992 OCT	.161	BDL		
1992 DEC	.082	.003 <T		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

	TREATMENT PLANT RAW	TREATMENT PLANT TREATED	CHEMISTRY (LABORATORY)	DET'N LIMIT = N/A	GUIDELINE = 500 (A3)
RESIDUE FILTRATE (MG/L)					
1992 MAR	308.000	CRO	346.000	CRO	
1992 MAY	332.000	CRO	343.000	CRO	
1992 JUN	459.000	CRO	502.000	CRO	
1992 JUL	475.000	CRO	485.000	CRO	
1992 AUG	431.000	CRO	469.000	CRO	
1992 SEP	413.000	CRO	453.000	CRO	
1992 OCT	377.000	CRO	407.000	CRO	
1992 DEC	400.000	CRO	428.000	CRO	
SULPHATE (MG/L)				DET'N LIMIT = 0.20	GUIDELINE = 500 (A3)
1992 MAR	30.200		36.200		
1992 MAY	34.340		35.620		
1992 JUN	92.150		98.660		
1992 JUL	72.880		71.550		
1992 AUG	67.290		77.650		
1992 SEP	45.370		56.690		
1992 OCT	34.540		47.220		
1992 DEC	39.760		46.660		
TURBIDITY (FTU)				DET'N LIMIT = 0.05	GUIDELINE = 1.0 (A1)
1992 MAR	122.000		.480		
1992 MAY	94.000		.160 < T		
1992 JUN	32.000		.230 < T		
1992 JUL	47.000		.250		
1992 AUG	31.000	USO	.570 USO		
1992 SEP	104.000		.240 < T		
1992 OCT	48.000		.280		
1992 DEC	17.900		.400		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT		TREATMENT PLANT	
RAW	TREATED	TREATED	TREATED
METALS			
SILVER (UG/L)	)	DET'N LIMIT = 0.05	GUIDELINE = N/A
16 SAMPLES	BDL	BDL	GUIDELINE = 100 (A4)
ALUMINUM (UG/L)	)	DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)
1992 MAR	1000.000	160.000	
1992 MAY	640.000	36.000	
1992 JUN	240.000	41.000	
1992 JUL	450.000	56.000	
1992 AUG	850.000	190.000	
1992 SEP	800.000	71.000	
1992 OCT	550.000	99.000	
1992 DEC	210.000	140.000	
ARSENIC (UG/L)	)	DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)
1992 MAR	.310 <T	BDL	
1992 MAY	.530 <T	BDL	
1992 JUN	BDL	BDL	
1992 JUL	1.400	.750 <T	
1992 AUG	.350 <T	.440 <T	
1992 SEP	1.200	.390 <T	
1992 OCT	1.300	.370 <T	
1992 DEC	.520 <T	BDL	
BARIUM (UG/L)	)	DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)
1992 MAR	38.000	24.000	
1992 MAY	34.000	22.000	
1992 JUN	43.000	39.000	
1992 JUL	42.000	35.000	
1992 AUG	37.000	33.000	
1992 SEP	44.000	32.000	
1992 OCT	40.000	28.000	
1992 DEC	29.000	18.000	
BORON (UG/L)	)	DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)
1992 MAR	16.000 <T	17.000 <T	
1992 MAY	22.000	20.000 <T	
1992 JUN	58.000	66.000	
1992 JUL	45.000	41.000	
1992 AUG	40.000	44.000	
1992 SEP	61.000	53.000	
1992 OCT	47.000	48.000	
1992 DEC	24.000	23.000	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT TREATMENT PLANT
RAW TREATED

METALS		DET'N LIMIT = 0.05		GUIDELINE = 6800 (D4)	
BERYLLIUM (UG/L))				
1992 MAR	.060 <T	BDL			
1992 MAY	.180 <T	BDL	.070 <T		
1992 JUN	BDL	BDL			
1992 JUL	.120 <T	BDL	BDL		
1992 AUG	BDL	BDL			
1992 SEP	.090 <T	BDL			
1992 OCT	.130 <T	BDL	.060 <T		
1992 DEC	BDL	BDL			
CADMIUM (UG/L)	)		DET'N LIMIT = 0.05		GUIDELINE = 5.0 (A1)
1992 MAR	.110 <T	BDL			
1992 MAY	.110 <T	BDL	.060 <T		
1992 JUN	.100 <T	BDL	.130 <T		
1992 JUL	.060 <T	BDL	BDL		
1992 AUG	BDL	BDL	.060 <T		
1992 SEP	.120 <T	BDL	BDL		
1992 OCT	.140 <T	BDL	.060 <T		
1992 DEC	BDL	BDL			
COBALT (UG/L)	)		DET'N LIMIT = 0.02		GUIDELINE = N/A
1992 MAR	1.200		.250 <T		
1992 MAY	.770 <T		.280 <T		
1992 JUN	.910 <T		.680 <T		
1992 JUL	.960 <T		.560 <T		
1992 AUG	.800 <T		.550 <T		
1992 SEP	.990 <T		.410 <T		
1992 OCT	.770 <T		.320 <T		
1992 DEC	.350 <T		.260 <T		
CHROMIUM (UG/L)	)		DET'N LIMIT = 0.50		GUIDELINE = 50.0 (A1)
1992 MAR	1.800 <T	BDL			
1992 MAY	1.200 <T	BDL			
1992 JUN	.800 <T	.650 <T			
1992 JUL	1.000 <T	BDL			
1992 AUG	.840 <T	BDL			
1992 SEP	6.600	3.700 <T			
1992 OCT	11.000	9.000			
1992 DEC	1.500 <T	.960 <T			

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT TREATMENT PLANT
RAW TREATED

METALS		DET'N LIMIT = 0.50		GUIDELINE = 1000 (A3)	
COPPER (UG/L))				
1992 MAR	38.000	2.900 <T			
1992 MAY	3.500 <T	4.800 <T			
1992 JUN	3.800 <T	7.900			
1992 JUL	3.800 <T	8.800			
1992 AUG	3.500 <T	6.100			
1992 SEP	3.600 <T	7.700			
1992 OCT	4.600 <T	13.700			
1992 DEC	3.100 <T	6.200			
IRON (UG/L)		DET'N LIMIT = 6.00		GUIDELINE = 300 (A3)	
1992 MAR	1500.000	24.000 <T			
1992 MAY	640.000	9.400 <T			
1992 JUN	280.000	9.900 <T			
1992 JUL	550.000	12.000 <T			
1992 AUG	320.000	13.000 <T			
1992 SEP	960.000	7.700 <T			
1992 OCT	490.000	10.000 <T			
1992 DEC	240.000	BDL			
MERCURY (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = 1.0 (A1)	
16 SAMPLES	BDL	BDL			
MANGANESE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 50.0 (A3)	
1992 MAR	150.000	13.000			
1992 MAY	71.000	13.000			
1992 JUN	48.000	6.600			
1992 JUL	66.000	23.000			
1992 AUG	44.000	22.000			
1992 SEP	110.000	6.400			
1992 OCT	48.000	13.000			
1992 DEC	27.000	18.000			
MOLYBDENUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = N/A	
1992 MAR	.140 <T	.750			
1992 MAY	.110 <T	.550			
1992 JUN	2.500	3.600			
1992 JUL	.830	1.300			
1992 AUG	1.400	1.800			
1992 SEP	.300 <T	.900			
1992 OCT	.370 <T	1.000			
1992 DEC	.330 <T	.500 <T			

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT
RAW
TREATED

METALS		DET'N LIMIT = 0.20		GUIDELINE = 350 (03)
NICKEL (UG/L))			
1992 MAR	3.900	1.600 <T		
1992 MAY	1.400 <T	.490 <T		
1992 JUN	4.800	5.500		
1992 JUL	2.100	1.000 <T		
1992 AUG	3.000	2.000 <T		
1992 SEP	4.200	2.000 <T		
1992 OCT	2.300	1.400 <T		
1992 DEC	BDL	BDL		
LEAD (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 10 (A1)
1992 MAR	5.300	.280 <T		
1992 MAY	1.900	.540		
1992 JUN	1.300	.670		
1992 JUL	1.300	.540		
1992 AUG	.830	.490 <T		
1992 SEP	3.000	.480 <T		
1992 OCT	1.300	.530		
1992 DEC	.540	.240 <T		
ANTIMONY (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 14.6 (04)
1992 MAR	.260 <T	.460 <T		
1992 MAY	.180 <T	.420 <T		
1992 JUN	.360 <T	.320 <T		
1992 JUL	.240 <T	.350 <T		
1992 AUG	.370 <T	.460 <T		
1992 SEP	.370 <T	.450 <T		
1992 OCT	.390 <T	.500 <T		
1992 DEC	.330 <T	.340 <T		
SELENIUM (UG/L)		DET'N LIMIT = 1.00		GUIDELINE = 10 (A1)
1992 MAR	BDL	BDL		
1992 MAY	BDL	BDL		
1992 JUN	BDL	1.600 <T		
1992 JUL	BDL	BDL		
1992 AUG	BDL	BDL		
1992 SEP	BDL	BDL		
1992 OCT	1.400 <T	2.400 <T		
1992 DEC	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT TREATMENT PLANT
RAW TREATED

METALS		DET'N LIMIT = 0.10		GUIDELINE = N/A	
STRONTIUM (UG/L))				
1992 MAR	230.000				
1992 MAY	240.000				
1992 JUN	820.000				
1992 JUL	600.000				
1992 AUG	580.000				
1992 SEP	450.000				
1992 OCT	350.000				
1992 DEC	330.000				
TITANIUM (UG/L))				
1992 MAR	17.000				
1992 MAY	20.000				
1992 JUN	17.000				
1992 JUL	24.000				
1992 AUG	15.000				
1992 SEP	15.000				
1992 OCT	27.000				
1992 DEC	15.000				
THALLIUM (UG/L))				
16 SAMPLES	BDL	BDL			
URANIUM (UG/L))				
16 SAMPLES	BDL	BDL			
VANADIUM (UG/L))				
1992 MAR	2.700				
1992 MAY	1.500				
1992 JUN	1.100				
1992 JUL	1.900				
1992 AUG	1.300				
1992 SEP	2.200				
1992 OCT	1.600				
1992 DEC	.570				

DET'N LIMIT = 0.50

DET'N LIMIT = 0.05

DET'N LIMIT = 0.05

DET'N LIMIT = 0.05

DET'N LIMIT = 0.05

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT TREATMENT PLANT
RAW TREATED

METALS		DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)
ZINC (UG/L))		
1992 MAR	41.000	3.700	
1992 MAY	15.000	6.500	
1992 JUN	11.000	10.000	
1992 JUL	10.000	7.200	
1992 AUG	6.900	6.300	
1992 SEP	19.000	6.000	
1992 OCT	11.000	15.000	
1992 DEC	8.300	7.300	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT		TREATMENT PLANT			
RAW	TREATED	TREATED	TREATED		
HEXAChlorobutadiene (ng/L)				DET'N LIMIT = 1.000	GUIDELINE = 450 (D4)
16 SAMPLES	BDL	BDL	BDL	BDL	GUIDELINE = N/A
123-TRICHLOROBENZENE (ng/L)				DET'N LIMIT = 5.000	GUIDELINE = N/A
16 SAMPLES	BDL	BDL	BDL	BDL	GUIDELINE = N/A
1234-TETrChlorobenzene (ng/L)				DET'N LIMIT = 1.000	GUIDELINE = N/A
16 SAMPLES	BDL	BDL	BDL	BDL	GUIDELINE = N/A
1235-TETrChlorobenzene (ng/L)				DET'N LIMIT = 1.000	GUIDELINE = N/A
16 SAMPLES	BDL	BDL	BDL	BDL	GUIDELINE = N/A
124-TRICHLOROBENZENE (ng/L)				DET'N LIMIT = 5.000	GUIDELINE = 10000 (1)
16 SAMPLES	BDL	BDL	BDL	BDL	GUIDELINE = 38000 (D4)
1245-TETrChlorobenzene (ng/L)				DET'N LIMIT = 1.000	GUIDELINE = N/A
16 SAMPLES	BDL	BDL	BDL	BDL	GUIDELINE = N/A
135-TRICHLOROBENZENE (ng/L)				DET'N LIMIT = 5.000	GUIDELINE = 10 (C1)
16 SAMPLES	BDL	BDL	BDL	BDL	GUIDELINE = 1900 (D4)
HEXAChloroethane (ng/L)				DET'N LIMIT = 1.000	GUIDELINE = N/A
16 SAMPLES	BDL	BDL	BDL	BDL	GUIDELINE = N/A
HEXAChloroethane (ng/L)				DET'N LIMIT = 1.000	GUIDELINE = N/A
1992 MAR	BDL	BDL	BDL	BDL	GUIDELINE = N/A
1992 MAY	BDL	BDL	BDL	BDL	GUIDELINE = N/A
1992 JUN	BDL	BDL	BDL	BDL	GUIDELINE = N/A
1992 JUL	BDL	BDL	BDL	BDL	GUIDELINE = N/A
1992 AUG	BDL	BDL	BDL	1.000 < T	GUIDELINE = N/A
1992 SEP	BDL	BDL	BDL	BDL	GUIDELINE = N/A
1992 OCT	BDL	BDL	BDL	2.000 < T	GUIDELINE = N/A
1992 DEC	BDL	BDL	BDL	BDL	GUIDELINE = N/A
OCTAChlorostyrene (ng/L)				DET'N LIMIT = 1.000	GUIDELINE = N/A
16 SAMPLES	BDL	BDL	BDL	BDL	GUIDELINE = N/A

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT	PLANT	TREATMENT	PLANT	
RAW	TREATED	TREATED		
CHLOROAROMATICS				
PENTACHLOROBENZENE (NG/L)			DET'N LIMIT = 1,000	GUIDELINE = 74000 (D4)
16 SAMPLES	BDL	BDL		
236-TRICHLOROTOLUENE (NG/L)			DET'N LIMIT = 5,000	GUIDELINE = N/A
16 SAMPLES	BDL	BDL		
245-TRICHLOROTOLUENE (NG/L)			DET'N LIMIT = 5,000	GUIDELINE = N/A
16 SAMPLES	BDL	BDL		
26A-TRICHLOROTOLUENE (NG/L)			DET'N LIMIT = 5,000	GUIDELINE = N/A
16 SAMPLES	BDL	BDL		

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	CHLOROPHENOLS (NG/L)	DET'N LIMIT = 100.0	GUIDELINE = N/A
4 SAMPLES	BOL	BOL		
2345-TRICHLOROPHENOL (NG/L)				
4 SAMPLES	BOL	BDL		
2345-TECHLOROPHENOL (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = N/A
4 SAMPLES	BOL	BDL		
2356-TECHLOROPHENOL (NG/L)				
4 SAMPLES	BDL	BDL		
245-TRICHLOROPHENOL (NG/L)			DET'N LIMIT = 10.0	GUIDELINE = N/A
4 SAMPLES	BDL	BDL		
246-TRICHLOROPHENOL (NG/L)			DET'N LIMIT = 100.0	GUIDELINE = 2600000 (04)
1992 MAY	BOL	BOL		
1992 OCT	BOL	20.000 <T		
PENTACHLOROPHENOL (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = 5000 (A1)
1992 MAY	BDL	BDL		
1992 OCT	10.000 <T	BDL		
				GUIDELINE = 600000 (A1)

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT
RAW
TREATMENT PLANT
TREATED

PESTICIDES AND PCB		DET'N LIMIT = 1,000		GUIDELINE = 700 (A1)
ALDRIN (NG/L)	)	BDL	BDL	
16 SAMPLES		BDL	BDL	
ALPHA BHC (NG/L)	)			DET'N LIMIT = 1,000
1992 MAR	BDL	BDL	BDL	
1992 MAY	BDL	BDL	1,000 <T	
1992 JUN	BDL	BDL	BDL	
1992 JUL	1,000 <T	BDL	BDL	
1992 AUG	BDL	BDL	BDL	
1992 SEP	1,000 <T	BDL	3,000 <T	
1992 OCT	1,000 <T	BDL	BDL	
1992 DEC	BDL	BDL	BDL	
BETA BHC (NG/L)	)			DET'N LIMIT = 1,000
16 SAMPLES		BDL	BDL	
LINDANE (GAMMA BHC) (NG/L)	)			DET'N LIMIT = 1,000
1992 MAR	BDL	BDL	BDL	
1992 MAY	BDL	BDL	BDL	
1992 JUN	3,000 <T	BDL	BDL	
1992 JUL	BDL	BDL	BDL	
1992 AUG	1,000 <T	BDL	1,000 <T	
1992 SEP	BDL	BDL	BDL	
1992 OCT	BDL	BDL	BDL	
1992 DEC	BDL	BDL	BDL	
ALPHA CHLORDANE (NG/L)	)			DET'N LIMIT = 2,000
16 SAMPLES		BDL	BDL	
GAMMA CHLORDANE (NG/L)	)			DET'N LIMIT = 2,00
16 SAMPLES		BDL	BDL	
OFIELDRIN (NG/L)	)			DET'N LIMIT = 2,00
16 SAMPLES		BDL	BDL	
METHOXYCHLOR (NG/L)	)			DET'N LIMIT = 5,0
16 SAMPLES		BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	PESTICIDES AND PCB	DET'N LIMIT	GUIDELINE
ENDOSULFAN 1 (NG/L)	BDL	BDL	DET'N LIMIT = 2.00	GUIDELINE = 74000 (D4)
16 SAMPLES	BDL	BDL		
ENDOSULFAN 11 (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 74000 (D4)
16 SAMPLES	BDL	BDL		
ENDRIN (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 1600 (D3)
16 SAMPLES	BDL	BDL		
ENDOSULFAN SULPHATE (NG/L)			DET'N LIMIT = 5.00	GUIDELINE = N/A
16 SAMPLES	BDL	BDL		
HEP'TACHLOR EPOXIDE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 3000 (A1)
14 SAMPLES	BDL	BDL		
HEP'TACHLOR (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 3000 (A1)
16 SAMPLES	BDL	BDL		
MIREX (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = N/A
16 SAMPLES	BDL	BDL		
OXYCHLORDANE (NG/L)			DET'N LIMIT = 2.000	GUIDELINE = N/A
16 SAMPLES	BDL	BDL		
O,P-DDT (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 30000 (A1)
16 SAMPLES	BDL	BDL		
PCB (NG/L)			DET'N LIMIT = 20.00	GUIDELINE = 3000 (A2)
16 SAMPLES	BDL	BDL		
P,P-DDD (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 30000 (A1)
16 SAMPLES	BDL	BDL		
P,P-DOE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 30000 (A1)
16 SAMPLES	BDL	BDL		

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992- OHWSWEKEN WTP

TABLE 4

TREATMENT PLANT	TREATMENT PLANT	PESTICIDES AND PCB	DET'N LIMIT = 5,000	GUIDELINE = 30000 (A1)
RAW	TREATED			
.P,P-DDT (NG/L)				
16 SAMPLES	BDL	BDL		
TOXAPHENE (NG/L)			DET'N LIMIT = 500.0	GUIDELINE = 5000 (A1)
16 SAMPLES	BDL	BDL		
AMETRINE (NG/L)			DET'N LIMIT = 50.0	GUIDELINE = 300000 (D3)
1992 MAR	BDL	BDL		
1992 MAY	BDL	BDL		
1992 JUN	BDL	BDL		
1992 JUL	BDL	BDL		
1992 AUG	BDL	BDL		
1992 SEP	60,000 <T	BDL		
1992 OCT	BDL	BDL		
1992 DEC	BDL	BDL		
ATRAZINE (NG/L)			DET'N LIMIT = 50.0	GUIDELINE = 60000 (A2)
1992 MAR	260,000 <T	300,000 <T		
1992 MAY	140,000 <T	150,000 <T		
1992 JUN	210,000 <T	140,000 <T		
1992 JUL	1240,000	1680,000		
1992 AUG	360,000 <T	360,000 <T		
1992 SEP	280,000 <T	260,000 <T		
1992 OCT	300,000 <T	220,000 <T		
1992 DEC	130,000 <T	150,000 <T		
ATRATONE (NG/L)			DET'N LIMIT = 50.0	GUIDELINE = N/A
16 SAMPLES	BDL	BDL		
CYANAZINE (BLADEX) (NG/L)			DET'N LIMIT = 100.0	GUIDELINE = 10000 (A2)
16 SAMPLES	BDL	BDL		
DESETHYL ATRAZINE (NG/L)			DET'N LIMIT = 200.0	GUIDELINE = 60000 (A2)
1992 MAR	280,000 <T	280,000 <T		
1992 MAY	BDL	BDL		
1992 JUN	BDL	BDL		
1992 JUL	460,000 <T	550,000 <T		
1992 AUG	200,000 <T	BDL		
1992 SEP	220,000 <T	220,000 <T		
1992 OCT	360,000 <T	260,000 <T		
1992 DEC	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	PESTICIDES AND PCB	DET'N LIMIT	GUIDELINE
0SEETHYL SIMAZINE (NG/L)	BDL	BDL	200.0	GUIDELINE = 10000 (A2)
16 SAMPLES	BDL	BDL		
PROMETONE (NG/L)	BDL	BDL	DET'N LIMIT = 50.000	GUIDELINE = 52500 (D3)
16 SAMPLES	BDL	BDL		
PROPAZINE (NG/L)	BDL	BDL	DET'N LIMIT = 50.000	GUIDELINE = 700000 (D3)
16 SAMPLES	BDL	BDL		
PROMETRYNE (NG/L)	BDL	BDL	DET'N LIMIT = 50.000	GUIDELINE = 1000 (A2)
16 SAMPLES	BDL	BDL		
METRIBUZIN (SENCOR) (NG/L)	BDL	BDL	DET'N LIMIT = 100.0	GUIDELINE = 80000 (A1)
16 SAMPLES	BDL	BDL		
SIMAZINE (NG/L)	BDL	BDL	DET'N LIMIT = 50.00	GUIDELINE = 10000 (A2)
1992 MAR	BDL	BDL		
1992 MAY	BDL	BDL		
1992 JUN	BDL	BDL		
1992 JUL	60.000 <†	BDL		
1992 AUG	BDL	BDL		
1992 SEP	BDL	BDL		
1992 OCT	BDL	BDL		
1992 DEC	BDL	BDL		
ALACHLOR (CLASS) (NG/L)	BDL	BDL	DET'N LIMIT = 500.0	GUIDELINE = 5000 (A2)
16 SAMPLES	BDL	BDL		
METOLACHLOR (NG/L)	BDL	BDL	DET'N LIMIT = 500.0	GUIDELINE = 50000 (A2)
16 SAMPLES	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT TREATMENT PLANT
RAW TREATED

PHENOLICS (UG/L)	PHENOLICS	DET'N LIMIT =	0.2	GUIDELINE = N/A
1992 MAR	.400 < T	1,400		
1992 MAY	BDL	BDL		
1992 JUN	BDL	BDL		
1992 JUL	.400 < T	BDL		
1992 AUG	1,400	.400 < T		
1992 SEP	1,000 < T	.400 < T		
1992 OCT	BDL	BDL		
1992 DEC	BDL	.800 < T		

TABLE 4. DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT TREATMENT PLANT
RAW TREATED

TREATMENT PLANT		TREATMENT PLANT			
PHENANTHRENE (NG/L)	POLYAROMATIC HYDROCARBONS	DET'N LIMIT	10.0	GUIDELINE	N/A
2 SAMPLES	BDL	BDL			
ANTHRACENE (NG/L)		DET'N LIMIT	1.0	GUIDELINE	N/A
2 SAMPLES	BDL	BDL			
FLUORANTHENE (NG/L)		DET'N LIMIT	20.0	GUIDELINE	42000 (D4)
2 SAMPLES	BDL	BDL			
PYRENE (NG/L)		DET'N LIMIT	20.0	GUIDELINE	N/A
2 SAMPLES	BDL	BDL			
BENZO(A)ANTHRACENE (NG/L)		DET'N LIMIT	20.0	GUIDELINE	N/A
2 SAMPLES	BDL	BDL			
CHRYSENE (NG/L)		DET'N LIMIT	50.0	GUIDELINE	N/A
2 SAMPLES	BDL	BDL			
DIMETH. BENZ(A)ANTHR (NG/L)		DET'N LIMIT	5.0	GUIDELINE	N/A
2 SAMPLES	BDL	BDL			
BENZO(E) PYRENE (NG/L)		DET'N LIMIT	50.0	GUIDELINE	N/A
2 SAMPLES	BDL	BDL			
BENZO(B) FLUORANTHEN (NG/L)		DET'N LIMIT	10.0	GUIDELINE	N/A
2 SAMPLES	BDL	BDL			
PERYLENE (NG/L)		DET'N LIMIT	10.0	GUIDELINE	N/A
2 SAMPLES	BDL	BDL			
BENZO(K) FLUORANTHEN (NG/L)		DET'N LIMIT	1.0	GUIDELINE	N/A
2 SAMPLES	BDL	BDL			
BENZO(A) PYRENE (NG/L)		DET'N LIMIT	5.0	GUIDELINE	10 (A1)
2 SAMPLES	BDL	BDL			

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT	PLANT	TREATMENT	PLANT	
RAW		TREATED		
BENZO(G,H,I) PERYLEN	(NG/L)	POLYAROMATIC HYDROCARBONS	DET'N LIMIT = 20.0	GUIDELINE = N/A
2 SAMPLES	BDL	BDL		
DIBENZO(A,H) ANTHRAC	(NG/L)		DET'N LIMIT = 10.0	GUIDELINE = N/A
2 SAMPLES	BDL	BDL		
INDENO(1,2,3-C,D) PY	(NG/L)		DET'N LIMIT = 20.0	GUIDELINE = N/A
2 SAMPLES	BDL	BDL		
BENZO(B) CHRYSENE	(NG/L)		DET'N LIMIT = 2.0	GUIDELINE = N/A
2 SAMPLES	BDL	BDL		
CORONENE	(NG/L)		DET'N LIMIT = 10.0	GUIDELINE = N/A
2 SAMPLES	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	SPECIFIC PESTICIDES	DET'N LIMIT	GUIDELINE
2,4,5-T (NG/L)	4 SAMPLES BDL	BDL	DET'N LIMIT = 50.0	GUIDELINE = 280000 (A1)
1992 MAY 1992 OCT	120.000 <1	BDL BDL	DET'N LIMIT = 100.0	GUIDELINE = 100000 (A1)
2,4-DB (NG/L)	4 SAMPLES BDL	BDL	DET'N LIMIT = 200.0	GUIDELINE = N/A
2,4,4 D PROPYONIC ACID (NG/L)	4 SAMPLES BDL	BDL	DET'N LIMIT = 100.0	GUIDELINE = N/A
DICAMBA (NG/L)	4 SAMPLES BDL	BDL	DET'N LIMIT = 50.0	GUIDELINE = 120000 (A1)
2,4,5-TP (SILVEX) (NG/L)	4 SAMPLES BDL	BDL	DET'N LIMIT = 20.00	GUIDELINE = 10000 (A1)
DAZINON (NG/L)	4 SAMPLES BDL	BDL	DET'N LIMIT = 20.0	GUIDELINE = 20000 (A1)
DICHLOROVOX (NG/L)	4 SAMPLES BDL	BDL	DET'N LIMIT = 20.0	GUIDELINE = N/A
CHLORPYRIFOS (NG/L)	2 SAMPLES BDL	BDL	DET'N LIMIT = 20.0	GUIDELINE = N/A
ETHION (NG/L)	4 SAMPLES BDL	BDL	DET'N LIMIT = 20.0	GUIDELINE = 35000 (G)
MALATHION (NG/L)	2 SAMPLES BDL	BDL	DET'N LIMIT = 20.0	GUIDELINE = 190000 (A1)
MEVINPHOS (NG/L)	2 SAMPLES BDL	BDL	DET'N LIMIT = 20.0	GUIDELINE = N/A

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT: RAW	TREATMENT PLANT: TREATED	SPECIFIC PESTICIDES	DET'N LIMIT	GUIDELINE
METHYL PARATHION (NG/L)	4 SAMPLES BDL	DET'N LIMIT = 50.0	GUIDELINE = 9000 (D3)	
METHYLTRITHION (NG/L)	4 SAMPLES BDL	DET'N LIMIT = 20.0	GUIDELINE = N/A	
PARATHION (NG/L)	4 SAMPLES BDL	DET'N LIMIT = 20.0	GUIDELINE = 50000 (A1)	
PHORATE (NG/L)	4 SAMPLES BDL	DET'N LIMIT = 20.0	GUIDELINE = 2000 (A2)	
RELDAN (NG/L)	4 SAMPLES BDL	DET'N LIMIT = 20.0	GUIDELINE = N/A	
RONNELL (NG/L)	4 SAMPLES BDL	DET'N LIMIT = 20.0	GUIDELINE = N/A	
CARBOFURAN (NG/L)	4 SAMPLES BDL	DET'N LIMIT = 20.0	GUIDELINE = N/A	
CHLORPROPHAM (CIPC) (NG/L)	4 SAMPLES BDL	DET'N LIMIT = 2000.0	GUIDELINE = 90000 (A1)	
DIALLATE (NG/L)	4 SAMPLES BDL	DET'N LIMIT = 2000.0	GUIDELINE = 350000 (G)	
EPTAM (NG/L)	4 SAMPLES BDL	DET'N LIMIT = 2000.0	GUIDELINE = N/A	
IPC (NG/L)	4 SAMPLES BDL	DET'N LIMIT = 2000.0	GUIDELINE = N/A	
PROPOXUR (NG/L)	4 SAMPLES BDL	DET'N LIMIT = 2000.0	GUIDELINE = 140000 (D3)	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	SPECIFIC PESTICIDES	DET N LIMIT = 200.0	GUIDELINE = 90000 (A1)
CARBARYL (NG/L) 4 SAMPLES	BDL	BDL		
BUTYLATE (NG/L) 4 SAMPLES	BOL	BDL	DET N LIMIT = 2000.0	GUIDELINE = 245000 (D3)

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT TREATMENT PLANT
RAW TREATED

BENZENE (UG/L)	VOLATILES	DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
1992 MAR	BDL	BDL	
1992 MAY	BDL	BDL	
1992 JUN	BDL	BDL	
1992 JUL	BDL	.050 <T	
1992 AUG	BDL	BDL	
1992 SEP	BDL	BDL	
1992 OCT	BDL	BDL	
1992 DEC	BDL	.050 <T	
GUIDELINE = 24 (A3)			
1992 MAR	BDL	.100 <T	
1992 MAY	BDL	.200 <T	
1992 JUN	BDL	.250 <T	
1992 JUL	BDL	.100 <T	
1992 AUG	BDL	.100 <T	
1992 SEP	BDL	.250 <T	
1992 OCT	BDL	BDL	
1992 DEC	BDL	.150 <T	
GUIDELINE = 2.4 (A3)			
1992 MAR	BDL	BDL	
1992 MAY	BDL	.100 <T	
1992 JUN	.050 <T	.150 <T	
1992 JUL	.050 <T	.100 <T	
1992 AUG	BDL	.100 <T	
1992 SEP	BDL	.100 <T	
1992 OCT	BDL	.150 <T	
1992 DEC	BDL	.100 <T	
GUIDELINE = 0.10			
P-XYLENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)
1992 MAR	BDL	BDL	
1992 MAY	BDL	BDL	
1992 JUN	BDL	BDL	
1992 JUL	BDL	BDL	
1992 AUG	BDL	BDL	
1992 SEP	BDL	.100 <T	
1992 OCT	BDL	.150 <T	
1992 DEC	BDL	.100 <T	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	VOLATILES	DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)
M-XYLENE (UG/L)				
1992 MAR	BDL	BDL		
1992 MAY	BDL	BDL		
1992 JUN	BDL	BDL	.100 <T	
1992 JUL	BDL	BDL	BDL	
1992 AUG	BDL	BDL	BDL	
1992 SEP	BDL	BDL	BDL	
1992 OCT	BDL	BDL	BDL	
1992 DEC	BDL	BDL	.100 <T	
O-XYLENE (UG/L)				
1992 MAR	BDL	BDL		
1992 MAY	BDL	BDL		
1992 JUN	BDL	BDL	.050 <T	
1992 JUL	BDL	BDL	BDL	
1992 AUG	BDL	BDL	BDL	
1992 SEP	BDL	BDL	.050 <T	
1992 OCT	BDL	BDL	BDL	
1992 DEC	BDL	BDL	BDL	
STYRENE (UG/L)				
1992 MAR	BDL	BDL		
1992 MAY	BDL	BDL		
1992 JUN	BDL	BDL	.100 <T	
1992 JUL	BDL	BDL	BDL	
1992 AUG	BDL	BDL	BDL	
1992 SEP	BDL	BDL	.100 <T	
1992 OCT	BDL	BDL	.150 <T	
1992 DEC	BDL	BDL	.100 <T	
1,1-DICHLOROETHYLENE (UG/L)				
16 SAMPLES	BDL	BDL		
METHYLENE CHLORIDE (UG/L)				
1992 MAR	BDL	BDL		
1992 MAY	BDL	BDL		
1992 JUN	BDL	BDL	BDL	
1992 JUL	BDL	BDL	BDL	
1992 AUG	BDL	BDL	BDL	
1992 SEP	BDL	BDL	BDL	
1992 OCT	BDL	BDL	BDL	
1992 DEC	4.000 <T		4.000 <T	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT TREATMENT PLANT
RAW TREATED

VOLATILES					
112-DICHLOROETHYLENE (UG/L)	)			DET'N LIMIT = 0.10	GUIDELINE = 70 (01)
16 SAMPLES	BDL	BDL	BDL		
1,1-DICHLOROETHANE (UG/L)	)			DET'N LIMIT = 0.100	GUIDELINE = N/A
16 SAMPLES	BDL	BDL	BDL		
CHLORFORM (UG/L)	)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)
1992 MAR	BDL	22.000			
1992 MAY	BDL	15.300			
1992 JUN	.200 <T	71.000			
1992 JUL	.200 <T	7.300			
1992 AUG	.100 <T	3.400			
1992 SEP	.400 <T	59.900			
1992 OCT	BDL	43.100			
1992 DEC	BDL	12.100			
111,TRICHLOROETHANE (UG/L)	)			DET'N LIMIT = 0.02	GUIDELINE = 200 (01)
16 SAMPLES	BDL	BDL	BDL		
1,2-DICHLOROETHANE (UG/L)	)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
16 SAMPLES	BDL	BDL	BDL		
CARBON TETRACHLORIDE (UG/L)	)			DET'N LIMIT = 0.20	GUIDELINE = 5 (A1)
16 SAMPLES	BDL	BDL	BDL		
1,2-DICHLOROPROPANE (UG/L)	)			DET'N LIMIT = 0.05	GUIDELINE = 5 (01)
16 SAMPLES	BDL	BDL	BDL		
TRICHLOROETHYLENE (UG/L)	)			DET'N LIMIT = 0.10	GUIDELINE = 50 (A1)
16 SAMPLES	BDL	BDL	BDL		
DICHLOROBROMOMETHANE (UG/L)	)			DET'N LIMIT = 0.05	GUIDELINE = 350 (A1+)
1992 MAR	BDL	2.800			
1992 MAY	BDL	2.800			
1992 JUN	BDL	22.850			
1992 JUL	BDL	1.400			
1992 AUG	BDL	1.050			
1992 SEP	BDL	10.400			
1992 OCT	BDL	10.150			
1992 DEC	BDL	3.700			

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT PLANT RAW	TREATMENT PLANT TREATED	VOLATILES	DET'N LIMIT = 0.05	GUIDELINE = 0.6 (D4)
112-TRICHLOROETHANE (UG/L)	16 SAMPLES	BDL	BDL	GUIDELINE = 0.6 (D4)
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)
1992 MAR	BDL	BDL		
1992 MAY	BDL	BDL		
1992 JUN	BDL	3,600		
1992 JUL	BDL	BDL		
1992 AUG	BDL	BDL		
1992 SEP	BDL	1,000		
1992 OCT	BDL	1,100		
1992 DEC	BDL	.500 < T		
TETRACHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 65 (A5)
1992 MAR	BDL	BDL		
1992 MAY	BDL	BDL		
1992 JUN	BDL	.050 < T		
1992 JUL	BDL	BDL		
1992 AUG	BDL	BDL		
1992 SEP	BDL	BDL		
1992 OCT	BDL	BDL		
1992 DEC	BDL	BDL		
BROMOFORM (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (A1+)
16 SAMPLES	BDL	BDL		
1122-TETRACHLOROETHANE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 0.17 (D4)
16 SAMPLES	BDL	BDL		
VINYL CHLORIDE (UG/L)			DET'N LIMIT = 0.100	GUIDELINE = 2 (D1)
16 SAMPLES	BDL	BDL		
C12-DICHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.100	GUIDELINE = 70 (D1)
16 SAMPLES	BDL	BDL		
CHLOROBENZENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 1510 (D3)
16 SAMPLES	BDL	BDL		

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 OHSWEKEN WTP

TREATMENT	PLANT	TREATMENT	PLANT	
RAW		TREATED		
VOLATILES				
1,4-DICHLOROBENZENE (UG/L)	)			DET'N LIMIT = 0.10
16 SAMPLES	BDL	BDL		GUIDELINE = 5 (A1)
1,3-DICHLOROBENZENE (UG/L)	)			DET'N LIMIT = 0.10
16 SAMPLES	BDL	BDL		GUIDELINE = 3750 (03)
1,2-DICHLOROBENZENE (UG/L)	)			DET'N LIMIT = 0.05
16 SAMPLES	BDL	BDL		GUIDELINE = 200 (A1)
ETHYLENE DIBROMIDE (UG/L)	)			DET'N LIMIT = 0.05
16 SAMPLES	BDL	BDL		GUIDELINE = 50 (D1)
TOTL TRIHALOMETHANES (UG/L)	)			DET'N LIMIT = 0.50
1992 MAR	BDL	24.800		GUIDELINE = 350 (A1)
1992 MAY	BDL	18.100		
1992 JUN	BDL	97.450		
1992 JUL	BDL	8.700		
1992 AUG	BDL	4.450 < T		
1992 SEP	BDL	BDL		
1992 OCT	BDL	54.350		
1992 DEC	BDL	16.300		

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)

CHEMISTRY (FLD)

FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A4)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)

CHEMISTRY (LAB)

ALKALINITY	MG/L	0.20	30-500 (A4)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.20	100.0 (F2)
CHLORIDE	MG/L	0.20	250.0 (A3)
COLOUR	TCU	0.50	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.00	400.0 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.10	5.0 (A3)
FLUORIDE	MG/L	0.01	1.5* (A1)
HARDNESS	MG/L	0.50	80-100 (A4)
IONCAL	DMNSLESS	N/A	N/A
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.10	30.0 (F2)
NITRATES (TOTAL)	MG/L	0.005	10.0 (A1)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
POTASSIUM	MG/L	0.010	10.0 (F2)
RESIDUE FILTRATE (CALCULATED TDS)	MG/L	N/A	500.0 (A3)
SODIUM	MG/L	0.20	200.0 (A4)
SULPHATE	MG/L	0.20	500.0 (A4)
TURBIDITY	FTU	0.05	1.0 (A1)

* The Maximum Acceptable Concentration (MAC) for naturally occurring fluoride in drinking water is 2.4 mg/L.

CHLOROAROMATICS

1,2,3-TRICHLOROBENZENE	NG/L	5.0	N/A
1,2,3,4-TETRACHLOROBENZENE	NG/L	1.0	N/A
1,2,3,5-TETRACHLOROBENZENE	NG/L	1.0	N/A
1,2,4-TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1,2,4,5-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
1,3,5-TRICHLOROBENZENE	NG/L	5.0	N/A
2,3,6-TRICHLOROTOLUENE	NG/L	5.0	N/A
2,4,5-TRICHLOROTOLUENE	NG/L	5.0	N/A
2,6A-TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE (HCB)	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)

CHLOROPHENOLS

2,3,4-TRICHLOROPHENOL	NG/L	100.0	N/A
2,3,4,5-TETRACHLOROPHENOL	NG/L	20.0	N/A
2,3,5,6-TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
2,4,5-TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
2,4,6-TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	N/A
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
POLYNUCLEAR AROMATIC HYDROCARBONS			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000 (D4)
INDENO[1,2,3-C,D] PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLDR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DESETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-ODD	NG/L	5.0	30000 (A1)
O,P-DDT	NG/L	5.0	30000 (A1)
P,P-DDT	NG/L	5.0	30000 (A1)
P,P-DDE	NG/L	1.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
DESETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)

PHENOLICS

PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	N/A
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SPECIFIC PESTICIDES

2,4 D PROPIONIC ACID	NG/L	100.0	N/A
2,4,5-TRICHLOROPHOENOXY ACETIC ACID	NG/L	50.0	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.0	100000 (A1)
2,4-DICHLOROPHENOXYBUTYRIC ACID (2,4-DB)	NG/L	200.0	N/A
2,4,5-TP (SILVEX)	NG/L	20.0	10000 (A1)
BUTYLATE (SUTAN)	NG/L	2000.0	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.0	90000 (A1)
CARBOFURAN	NG/L	2000.0	90000 (A1)
CHLORPROPHAM (CIPC)	NG/L	2000.0	350000 (G)
CHLORPYRIFOS (DURSBAN)	NG/L	20.0	N/A
DIALLATE	NG/L	2000.0	N/A
DIAZINON	NG/L	20.0	20000 (A1)
DICAMBA	NG/L	50.0	120000 (A1)
DICHLOROVOS	NG/L	20.0	N/A
EPTAM	NG/L	2000.0	N/A
ETHION	NG/L	20.0	35000 (G)
IPC	NG/L	2000.0	N/A
MALATHION	NG/L	20.0	190000 (A1)
METHYL PARATHION	NG/L	50.0	9000 (D3)
METHYLTRITHION	NG/L	20.0	N/A
MEVINPHOS	NG/L	20.0	N/A
PARATHION	NG/L	20.0	50000 (A1)
PHORATE (THIMET)	NG/L	20.0	2000 (A2)
PICHLORAM	NG/L	100.0	190000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.0	140000 (D3)
RELDAN	NG/L	20.0	N/A
RONNEL	NG/L	20.0	N/A

VOLATILES

1,1-DICHLOROETHANE	UG/L	0.10	N/A
1,1-DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2-DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2-DICHLOROETHANE	UG/L	0.05	5 (A1)
1,2-DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3-DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4-DICHLOROBENZENE	UG/L	0.10	5 (A1)
1,1,1-TRICHLOROETHANE	UG/L	0.02	200 (D1)
1,1,2-TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1,1,2,2-TETRACHLOROETHANE	UG/L	0.05	0.17 (D4)

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
CIS 1,2-DICHLOROETHYLENE	UG/L	0.10	70 (D1)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2,4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	65 (A5)
TRANS 1,2-DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)
VINYL CHLORIDE	UG/L	0.10	2 (D1)

RADIONUCLIDES

TRITIUM	BQ/L	7.0	40000 (A1)
GROSS ALPHA COUNT	BQ/L	0.04	0.55# (D1)
GROSS BETA COUNT	BQ/L	0.04	N/A
COBALT 60	BQ/L	0.70	N/A
CESIUM 134	BQ/L	0.70	N/A
CESIUM 137	BQ/L	0.70	50 (A1)
IODINE 131	BQ/L	0.70	10 (A1)

Equal to 15.0 Picocuries/litre

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1992, 109 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment and Energy (MOEE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOEE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOEE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOEE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOEE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOEE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOEE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

PARAMETER REFERENCE INFORMATION

NAME: BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 $\mu\text{g/L}$

SYNOMYS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27)
CYCLOHEXATRIENE (41)

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NONPOLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30)

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41)
THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER
THRESHOLD TASTE: 0.5 mg/L IN WATER (39)
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80)

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION; PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES: MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27)
BOILING POINT: 80.1°C (27)
SPECIFIC GRAVITY: 0.8790 AT 20°C (27)
VAPOUR PRESSURE: 100 MM AT 26.1°C (27)
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41)
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39)
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)
SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC), (OWTRI)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top
Specific Pesticides (OWCP), (PEOP), (PECAR)	-as per Organics -three extra bottles must be filled
Polyaromatic hydrocarbons (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate
Cyanide (Treated only)	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (Caution: NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (Caution: HNO_3 & $K_2Cr_2O_7$ are corrosive)

Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year) (PBVOL), (PBEXT)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.
6. No smoking in area of sample location.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO ₃) (Caution: HNO ₃ is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.

5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	<ul style="list-style-type: none"> -500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	<ul style="list-style-type: none"> -250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	<ul style="list-style-type: none"> -500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO₃ (Caution: HNO₃ is corrosive)
Volatiles (duplicate) (OPOPUP)	<ul style="list-style-type: none"> -45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC)	<ul style="list-style-type: none"> -1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top
Polyaromatic Hydrocarbons (OAPAHX)	<ul style="list-style-type: none"> -1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate

Steps:

1. Record time of day on submission sheet.
2. Let cold water flow for five minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

